

A.D

PATENT COOPERATION TREATY

PCT

NOTIFICATION RELATING TO PRIORITY CLAIM

(PCT Rules 26bis.1 and 26bis.2 and
Administrative Instructions, Sections 402 and 409)

From the INTERNATIONAL BUREAU

To:

PRAGSTEN, Rolf
 Telia Research AB
 Vitsandsgatan 9
 S-123 86 Farsta
 SUÈDE

Date of mailing (day/month/year) 17 January 2000 (17.01.00)	
Applicant's or agent's file reference Case 703 PCT	IMPORTANT NOTIFICATION
International application No. PCT/SE99/01548	International filing date (day/month/year) 06 September 1999 (06.09.99)
Applicant TELIA AB (publ) et al	

The applicant is hereby notified of the following in respect of the priority claim(s) made in the international application.

1. **Correction of priority claim.** In accordance with the applicant's notice received on: 22 November 1999 (22.11.99), the following priority claim has been corrected to read as follows:

SE 10 September 1998 (10.09.98) 9803064-6

- even though the indication of the number of the earlier application is missing.
- even though the following indication in the priority claim is not the same as the corresponding indication appearing in the priority document:

2. **Addition of priority claim.** In accordance with the applicant's notice received on: , the following priority claim has been added:

- even though the indication of the number of the earlier application is missing.
- even though the following indication in the priority claim is not the same as the corresponding indication appearing in the priority document:

3. As a result of the correction and/or addition of (a) priority claim(s) under items 1 and/or 2, the (earliest) priority date is:

4. **Priority claim considered not to have been made.**

- The applicant failed to respond to the Invitation under Rule 26bis.2(a) (Form PCT/IB/316) within the prescribed time limit.
- The applicant's notice was received after the expiration of the prescribed time limit under Rule 26bis.1(a).
- The applicant's notice failed to correct the priority claim so as to comply with the requirements of Rule 4.10.

The applicant may, before the technical preparations for international publication have been completed and subject to the payment of a fee, request the International Bureau to publish, together with the international application, information concerning the priority claim. See Rule 26bis.2(c) and the PCT Applicant's Guide, Volume I, Annex B2(1B).

5. In case where multiple priorities have been claimed, the above item(s) relate to the following priority claim(s):

6. A copy of this notification has been sent to the receiving Office and

- to the International Searching Authority (where the international search report has not yet been issued).
- the designated Offices (which have already been notified of the receipt of the record copy).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. (41-22) 740.14.35	Authorized officer Athina Nickitas-Etienne Telephone No. (41-22) 338.83.38
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WO 00/1499
PCT/SE99/01

PATENT COOPERATION TREATY

PCT

NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

From the INTERNATIONAL BUREAU

To:

PRAGSTEN, Rolf
Telia Research AB
Vitsandsgatan 9
S-123 86 Farsta
SUEDE

TELE 03-27
Telia AB

Date of mailing (day/month/year) 16 March 2000 (16.03.00)	Applicant's or agent's file reference Case 703 PCT
International application No. PCT/SE99/01548	International filing date (day/month/year) 06 September 1999 (06.09.99)
Applicant TELIA AB (publ) et al	Priority date (day/month/year) 10 September 1998 (10.09.98)

IMPORTANT NOTICE

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:
EP,US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:
EE,LT,LV,NO

The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on 16 March 2000 (16.03.00) under No. WO 00/14995

REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, a demand for international preliminary examination must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the national phase, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

The International Bureau of WIPO
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Facsimile No. (41-22) 740.14.35

Form PCT/IB/308 (July 1996)

Authorized officer

J. Zahra

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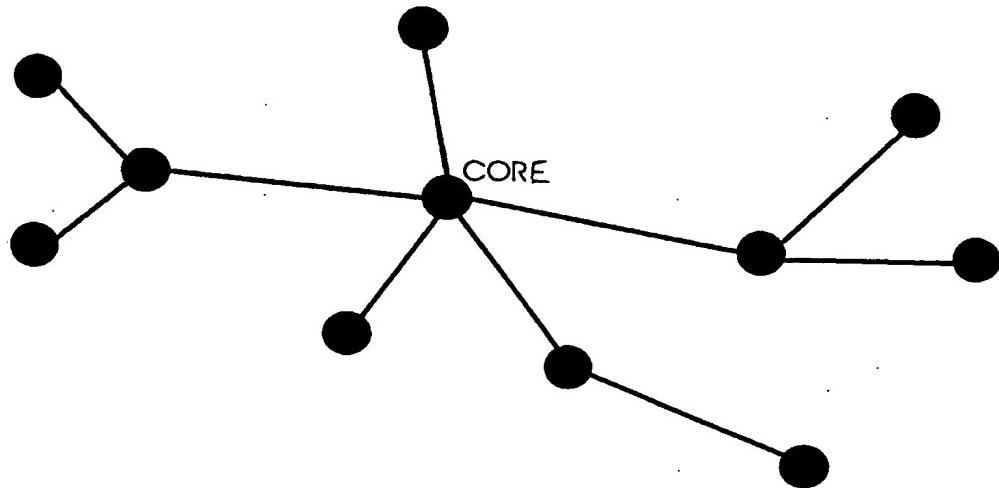
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International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : H04Q 11/04	A1	(11) International Publication Number: WO 00/14995 (43) International Publication Date: 16 March 2000 (16.03.00)
(21) International Application Number: PCT/SE99/01548		(81) Designated States: EE, LT, LV, NO, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).
(22) International Filing Date: 6 September 1999 (06.09.99)		
(30) Priority Data: 9803064-6 10 September 1998 (10.09.98) SE		Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>
(71) Applicant (for all designated States except US): TELIA AB (publ) [SE/SE]; Mårbackagatan 11, S-123 86 Farsta (SE).		
(72) Inventor; and		
(75) Inventor/Applicant (for US only): KAVAK, Nail [SE/SE]; Myrstuguvägen 359, S-143 32 Vårby (SE).		
(74) Agent: PRAGSTEN, Rolf; Telia Research AB, Vitsandsgatan 9, S-123 86 Farsta (SE).		

(54) Title: IMPROVEMENTS IN, OR RELATING TO, MULTICASTING IN ATM-NETWORKS



(57) Abstract

The present invention employs a novel multipoint-to-multipoint multi-cast architecture in an IPATM network. The mechanism of the present invention is significantly simpler and scales better than existing proposals because it does not require any address resolution architecture and requires substantially fewer resources in terms of virtual circuits (VC), CPU power and memory storage. The main characteristics of the SSAM of the present invention are that both sender and receivers reside on the same delivery tree and only one VC is used to send data over that tree. The delivery tree is a spanning tree and the packets are replicated only on the branches where they are needed. This is achieved by an algorithm in which the switches keep track of the branches of the tree where there are group members. The interleaving of ATM cells is prevented by a VC merging mechanism. A core selection mechanism is provided which optimises the shape of the tree structure.

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EE	Estonia						

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 99/01548

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04Q 11/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Computer Communication and Networks. Proceedings, 6th Int. Conf., Volume, 1997, Sridhar Komandur et al, "SPAM: A Data Forwarding Model for Multipoint-to-Multipoint Connection Support in ATM Networks", p.386 right col. line 22-p.387 left col. line 15 --	1-2,19-28,37
X	IEEE, Milcom 96 Conference Proceedings, Volume 2, October 1996, Mohammed Arozullah et al, "A Scalable Multicast Routing Algorithm for IP-ATM-IP Networks", p.478 right col. line 33-p.479 right col. line 34 --	1-4,7-9, 16-19,21-28, 30,34-37

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier document but published on or after the international filing date	"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"J" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

10 February 2000

Date of mailing of the international search report

2000-02-16

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 99/01548

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0800329 A2 (LUCENT TECHNOLOGIES INC.), 8 October 1997 (08.10.97), column 2, line 19 - line 33; column 3, line 5 - line 53; column 5, line 6 - line 17, abstract, col. 9, line 51 - col. 10, line 7; col 10, line 17 - 40; col. 11, line 44 - col. 12, line 29 -- -----	1-12,14-18, 21-28,30, 34-37

INTERNATIONAL SEARCH REPORT

Information on patent family members

02/12/99

International application No.

PCT/SE 99/01548

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0800329 A2	08/10/97	CA 2198308 A JP 10032594 A US 5831975 A	05/10/97 03/02/98 03/11/98

JC08 Rec'd PCT/PTO 07 MAR 2001

CLAIMS

1. An IPATM transmission network, comprising a plurality of nodes a plurality of endpoints adapted to act as data senders, or receivers, said nodes and endpoints being linked by ATM, said IPATM transmission network adapted to support multipoint-to-multipoint multi-casting between a group of endpoints, characterised in that at least one sender and all receivers, belonging to a multi-casting group of endpoints, are located on a single spanning delivery tree, and in that only one VC is employed to transmit data over said single spanning delivery tree, that a group having members closely located to each other, uses a multi-cast group address held by an MNS server located close to said group members, and in that an MNS server located close to said group members is selected by:

- a host requesting its local MNS server for a new multi-cast group address;
- said local MNS server supplying a multi-cast address from its own addresses; or
- if said local MNS server has no unused addresses, said local MNS server supplying an address for a nearest located other MNS server.

2. An IPATM transmission network comprising a plurality of nodes a plurality of endpoints adapted to act as data senders, or receivers, said nodes and endpoints being linked by ATM, said IPATM transmission network adapted to support multipoint-to-multipoint multi-casting between a group of endpoints, characterised in that said IPATM transmission network includes means for building a single spanning delivery tree between at least one sender and all receivers, belonging to a multi-casting group of endpoints, and in that only one VC is employed to transmit data over said single spanning delivery tree.

3. An IPATM transmission network, as claimed in either claim 1, or 2, characterised in that said single spanning delivery tree is a CBT rooted in a core node.

4. An IPATM transmission network, as claimed in claim 3, characterised in that said CBT is built at the ATM level.

5. An IPATM transmission network, as claimed in either claim 3, or claim 4, characterised in that said IPATM transmission network includes relocation means for relocating the core.

10. An IPATM transmission network, as claimed in any previous claim, characterised in that said IPATM transmission network is adapted to have more than one active core, said cores being geographically remote from each other.

15. An IPATM transmission network, as claimed in any previous claim, characterised in that there is provided forwarding means adapted to forward traffic only to those branches of said single spanning delivery tree where said traffic is required.

20. An IPATM transmission network, as claimed in claim 7, characterised in that operation of said forwarding means does not depend on core location.

25. An IPATM transmission network, as claimed in any of claims 3 to 8, characterised in that said IPATM transmission network includes MNS means adapted to provide an ATM address for the core, on receipt of an Internet multi-cast address.

30. An IPATM transmission network, as claimed in claim 9, characterised in that said MNS means is adapted to provide core point management and multi-cast group management.

35. An IPATM transmission network, as claimed in either claim 9, or 10, characterised in that said MNS means includes a hierarchy of MNS servers.

12. An IPATM transmission network, as claimed in any of claims 9 to 11, characterised in that said IPATM transmission network has only one MNS server,

and in that said only one MNS server is responsible for all multi-cast group addresses.

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13. An IPATM transmission network, as claimed in any previous claim, characterised in that said MNS means includes border routers adapted to translate between protocols thereby enabling said MNS means to co-exist with other multi-cast protocols.

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14. An IPATM transmission network, as claimed in any previous claim, characterised in that means are provided to permit leaf initiated join.

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15. An IPATM transmission network, as claimed in any previous claim, characterised in that means are provided to facilitate an endpoint to switch from functioning as a sender to functioning as a receiver.

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17.6 An IPATM transmission network, as claimed in any previous claim, characterised in that means are provided to facilitate an endpoint to switch from functioning as a receiver to functioning as a sender.

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17. An IPATM transmission network, as claimed in any previous claim, characterised in that means are provided to enable a new member to join a group, said means being adapted to cause a join message to be propagated towards said group's core.

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18. An IPATM transmission network, as claimed in any previous claim, characterised in that multipoint-to-multipoint connections are provided at the ATM level.

19. An IPATM transmission network, as claimed in any previous claim, characterised in that ATM switches in said IPATM transmission network are adapted to behave as store and forward units in the presence of contention, as cell switches in the absence of contention.

20. An IPATM transmission network, as claimed in any previous claim, characterised in that a VC merging means is provided for preventing interleaving of ATM cells, and in that a core selection means is provided to optimise the shape of a spanning delivery tree's structure.

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21. In an IPATM transmission network comprising a plurality of nodes and a plurality of endpoints adapted to act as data senders, or receivers, said nodes and endpoints being linked by ATM, a method of multipoint-to-multipoint multi-casting characterised by building a single spanning delivery tree between at least one sender and all receivers, belonging to a multi-casting group of endpoints, and by employing only one VC to transmit data over said single spanning delivery tree.

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22. A method, as claimed in claim 1, characterised by said single spanning delivery tree being CBT rooted in a core node.

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23. A method, as claimed in either claim 1, or 22, characterised by relocating the core to optimise said spanning delivery tree's structure.

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24. A method, as claimed in any of claims 1 to 23, characterised by forwarding traffic only to those branches of said single spanning delivery tree where said traffic is required.

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25. A method, as claimed in any of claims 1 to 24, characterised by join requests, from receivers and senders, propagating towards said core.

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26. A method, as claimed in any of claims 2 to 25, characterised by said IPATM transmission network including MNS, said MNS providing an ATM address for the core, when given an I multi-cast address.

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27. A method, as claimed in any of claims 1 to 26, characterised by replicating packets only on branches of said spanning delivery tree where they are needed.

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28. A method, as claimed in either claim 26, or 27, characterised by:

- configuring a host wishing to use said MNS with an ATM address for a local MNS server;

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- said host, when it wishes to become a member of multi-casting group, transmitting a query to a local MNS server for an address for the core of said multi-casting group;

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- said local MNS server, if it is responsible for the group, replying with an ATM address for the core;

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- if said local MNS is not responsible for the group, passing t query between MNS servers, in a MNS hierarchy, until it reaches a MNS server which is responsible for said group and said responsible MNS server replying to the querying host;

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- said MNS hierarchy starting with a root MNS server which knows, at the next level, which server is responsible for which intervals of multi-cast address space;

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- second level MNS servers knowing how an address range they ar responsible for is divided into smaller address intervals and whic third level MNS server is responsible for which address interval; and

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- sending queries through t MNS server hierarchy, until the MNS server, which holds the tables for the groups it is responsible for is reached.

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29. A method, as claimed in any of claims 27 to 29, characterised by every MNS server starting with an empty table, and by dynamically creating entries therein.

30. A method, as claimed in any of claims 7 to 29, characterised by realising query passing in two different ways, namely:

- if an MNS server is not responsible for a group, passing a query to a root MNS server, which passes it on, or

5 - passing a query only one level up to MNS hierarchy, and not directly to the root MNS server.

10 31. A method, as claimed in any of claims 6 to 30, characterised by registering the core node for a multi-cast group with the MNS server responsible for the group and, if a query arrives at MNS server about a group and no core is specified for the group, by electing the switch that sent the query as the core, and by said switch being able to decline nomination as the core and, if said switch does not accept nomination as the core, by not establishing a spanning delivery tree.

15 32. A method, as claimed in any of claims 5 to 31, characterised by a group having members closely located to each other, using a multi-cast group address held by an MNS server located close to said group members, and by selecting an MNS server located close to said group members by means of the following steps:

- a host requesting its local MNS server for a new multi-cast group address;

25 - said local MNS server then being responsible for supplying a multi-cast address from its own addresses; or

30 - if said local MNS server has no unused address, said local MNS server supplying an address for the nearest other MNS server to said local MNS server.

33. A method, as claimed in any of claims 1 to 32, characterised by causing a join message to be propagated towards said group's core when a new member indicates a desire to join a group.

34 A method, as claimed in any of claims 1 to 33, characterised by transmitting a leave message over the spanning delivery tree associated with group towards said group's core when a member of that group indicates a desire to leave the group, by said leave message travelling until it reaches a first junction of said spanning delivery tree, and by removing that part of said spanning delivery tree over which said message has travelled.

5 35. A method, as claimed in any of claims 21 to 34, characterised by 10 group members periodically sending an "I am alive" message to neighbouring nodes, or endpoints.

15 36. A telecommunications system, characterised in that said telecommunications system includes an IPATM transmission network as claimed in any of claims 1 to 21, or operating the method as claimed in any of claims 1 to 35.

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CLAIMS

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1. An IPATM transmission network, comprising a plurality of nodes and a plurality of endpoints adapted to act as data senders, or receivers, said nodes and endpoints being linked by ATM, said IPATM transmission network adapted to support multipoint-to-multipoint multi-casting between a group of endpoints, characterised in that at least one sender and all receivers, belonging to a multi-casting group of endpoints, are located on a single spanning delivery tree, and in that only one VC is employed to transmit data over said single spanning delivery tree.

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2. An IPATM transmission network comprising a plurality of nodes and a plurality of endpoints adapted to act as data senders, or receivers, said nodes and endpoints being linked by ATM, said IPATM transmission network adapted to support multipoint-to-multipoint multi-casting between a group of endpoints, characterised in that said IPATM transmission network includes means for building a single spanning delivery tree between at least one sender and all receivers, belonging to a multi-casting group of endpoints, and in that only one VC is employed to transmit data over said single spanning delivery tree.

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3. An IPATM transmission network, as claimed in either claim 1, or 2, characterised in that said single spanning delivery tree is a CBT rooted in a core node.

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4. An IPATM transmission network, as claimed in claim 3, characterised in that said CBT is built at the ATM level.

5. An IPATM transmission network, as claimed in either claim 3, or claim 4, characterised in that said IPATM transmission network includes relocation means for relocating the core.

6. An IPATM transmission network, as claimed in any previous claim, characterised in that said IPATM transmission network is adapted to have more than one active core, said cores being geographically remote from each other.

- 22 -

7. An IPATM transmission network, as claimed in any previous claim, characterised in that there is provided forwarding means adapted to forward traffic only to those branches of said single spanning delivery tree where said traffic is required.

5 8. An IPATM transmission network, as claimed in claim 7, characterised in that operation of said forwarding means does not depend on core location.

0 9. An IPATM transmission network, as claimed in any of claims 3 to 8, characterised in that said IPATM transmission network includes MNS means adapted to provide an ATM address for the core, on receipt of an IP multi-cast address.

10. An IPATM transmission network, as claimed in claim 9, characterised in that said MNS means is adapted to provide core point management and multi-cast group management.

15 11. An IPATM transmission network, as claimed in either claim 9, or 10, characterised in that said MNS means includes a hierarchy of MNS servers.

12. An IPATM transmission network, as claimed in any of claims 9 to 11, characterised in that said IPATM transmission network has only one MNS server, and in that said only one MNS server is responsible for all multi-cast group addresses.

13. An IPATM transmission network, as claimed in any of claims 1 to 11, characterised in that a group having members closely located to each other, uses a multi-cast group address held by an MNS server located close to said group members, and in that an MNS server located close to said group members is selected by:

- 25
- a host requesting its local MNS server for a new multi-cast group address;
 - said local MNS server supplying a multi-cast address from its own

- 23 -

addresses; or

- if said local MNS server has no unused addresses, said local MNS server supplying an address for a nearest located other MNS server.

5 14. An IPATM transmission network, as claimed in any previous claim, characterised in that said MNS means includes border routers adapted to translate between protocols thereby enabling said MNS means to co-exist with other multi-cast protocols.

15 15. An IPATM transmission network, as claimed in any previous claim, characterised in that means are provided to permit leaf initiated join.

10 16. An IPATM transmission network, as claimed in any previous claim, characterised in that means are provided to facilitate an endpoint to switch from functioning as a sender to functioning as a receiver.

15 17. An IPATM transmission network, as claimed in any previous claim, characterised in that means are provided to facilitate an endpoint to switch from functioning as a receiver to functioning as a sender.

18. An IPATM transmission network, as claimed in any previous claim, characterised in that means are provided to enable a new member to join a group, said means being adapted to cause a join message to be propagated towards said group's core.

20 19. An IPATM transmission network, as claimed in any previous claim, characterised in that multipoint-to-multipoint connections are provided at the ATM level.

25 20. An IPATM transmission network, as claimed in any previous claim, characterised in that ATM switches in said IPATM transmission network are adapted to behave as store and forward units in the presence of contention, and as cell switches in the absence of contention.

- 24 -

21. An IPATM transmission network, as claimed in any previous claim, characterised in that a VC merging means is provided for preventing interleaving of ATM cells, and in that a core selection means is provided to optimise the shape of a spanning delivery tree's structure.

5 22. In an IPATM transmission network comprising a plurality of nodes and a plurality of endpoints adapted to act as data senders, or receivers, said nodes and endpoints being linked by ATM, a method of multipoint-to-multipoint multi-casting characterised by building a single spanning delivery tree between at least one sender and all receivers, belonging to a multi-casting group of endpoints, and by employing only one VC to transmit data over said single spanning delivery tree.

10 23. A method, as claimed in claim 22, characterised by said single spanning delivery tree being a CBT rooted in a core node.

24. A method, as claimed in either claim 22, or 23, characterised by relocating the core to optimise said spanning delivery tree's structure.

15 25. A method, as claimed in any of claims 22 to 24, characterised by forwarding traffic only to those branches of said single spanning delivery tree where said traffic is required.

26. A method, as claimed in any of claims 23 to 25, characterised by join requests, from receivers and senders, propagating towards said core.

30 27. A method, as claimed in any of claims 23 to 26, characterised by said IPATM transmission network including an MNS, said MNS providing an ATM address for the core, when given an IP multi-cast address.

28. A method, as claimed in any of claims 22 to 27, characterised by replicating packets only on branches of said spanning delivery tree where they are needed.

25 29. A method, as claimed in either claim 27, or 28, characterised by:

- configuring a host wishing to use said MNS with an ATM address for

- 25 -

a local MNS server;

- said host, when it wishes to become a member of a multi-casting group, transmitting a query to a local MNS server for an address for the core of said multi-casting group;

5

- said local MNS server, if it is responsible for the group, replying with an ATM address for the core;

- if said local MNS is not responsible for the group, passing the query between MNS servers, in a MNS hierarchy, until it reaches a MNS server which is responsible for said group and said responsible MNS server replying to the querying host;

10

- said MNS hierarchy starting with a root MNS server which knows, at the next level, which server is responsible for which intervals of a multi-cast address space;

15

- second level MNS servers knowing how an address range they are responsible for is divided into smaller address intervals and which third level MNS server is responsible for which address interval; and

- sending queries through the MNS server hierarchy, until the MNS server, which holds the tables for the groups it is responsible for is reached.

20 30. A method, as claimed in any of claims 27 to 29, characterised by every MNS server starting with an empty table, and by dynamically creating entries therein.

31. A method, as claimed in any of claims 28 to 30, characterised by realising query passing in two different ways, namely:

- if an MNS server is not responsible for a group, passing a query to a root MNS server, which passes it on, or

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- 26 -

- passing a query only one level up the MNS hierarchy, and not directly to the root MNS server.

5 32. A method, as claimed in any of claims 27 to 31, characterised by registering the core node for a multi-cast group with the MNS server responsible for the group and, if a query arrives at an MNS server about a group and no core is specified for the group, by electing the switch that sent the query as the core, and by said switch being able to decline nomination as the core and, if said switch does not accept nomination as the core, by not establishing a spanning delivery tree.

) 33. A method, as claimed in any of claims 27 to 32, characterised by a group having members closely located to each other, using a multi-cast group address held by an MNS server located close to said group members, and by selecting an MNS server located close to said group members by means of the following steps:

- a host requesting its local MNS server for a new multi-cast group address;
- 15 said local MNS server then being responsible for supplying a multi-cast address from its own addresses; or
- if said local MNS server has no unused address, said local MNS server supplying an address for the nearest other MNS server to said local MNS server.

) 34. A method, as claimed in any of claims 22 to 33, characterised by causing a join message to be propagated towards said group's core when a new member indicates a desire to join a group.

25 35 A method, as claimed in any of claims 22 to 34, characterised by transmitting a leave message over the spanning delivery tree associated with a group towards said group's core when a member of that group indicates a desire to leave the group, by said leave message travelling until it reaches a first junction of said spanning delivery tree, and by removing that part of said spanning delivery tree over which said message has travelled.

- 27 -

36. A method, as claimed in any of claims 22 to 35, characterised by group members periodically sending an "I am alive" message to neighbouring nodes, or endpoints.

5 37. A telecommunications system, characterised in that said telecommunications system includes an IPATM transmission network as claimed in any of claims 1 to 21, or operating the method as claimed in any of claims 22 to 36..

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION

REC'D	19 DEC 2000
REPORT	PCT

(PCT Article 36 and Rule 70)

3

Applicant's or agent's file reference Case 703 PCT	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/SE99/01548	International filing date (<i>day month year</i>) 06.09.1999	Priority date (<i>day month year</i>) 10.09.1998
International Patent Classification (IPC) or national classification and IPC7 H04Q 11/04		
Applicant Telia AB (publ) et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 7 sheets.

3. This report contains indications relating to the following items:

- I Basis of the report
- II Priority
- III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV Lack of unity of invention
- V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI Certain documents cited
- VII Certain defects in the international application
- VIII Certain observations on the international application

Date of submission of the demand 07.04.2000	Date of completion of this report 12.12.2000
Name and mailing address of the IPEA/SE Patent- och registreringsverket Post 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88	Authorized officer Oskar Pihlgren /OGU Telephone No. 08-782 25 00

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE99/01548

I. Basis of the report

1. With regard to the elements of the international application:*

 the international application as originally filed the description:

pages 1-20 , as originally filed

pages , filed with the demand

pages , filed with the letter of _____

 the claims:

pages , as originally filed

pages , as amended (together with any statement) under article 19

pages , filed with the demand

pages 1-7 , filed with the letter of 10.10.2000

 the drawings:

pages 1-9 , as originally filed

pages , filed with the demand

pages , filed with the letter of _____

 the sequence listing part of the description:

pages , as originally filed

pages , filed with the demand

pages , filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

 the language of a translation furnished for the purposes of international search (under Rule 23.1(b)). the language of publication of the international application (under Rule 48.3(b)). the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

 contained in the international application in written form. filed together with the international application in computer readable form. furnished subsequently to this Authority in written form. furnished subsequently to this Authority in computer readable form. The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished. The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.4. The amendments have resulted in the cancellation of: the description, pages _____ the claims, Nos. _____ the drawings, sheet/fig _____5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2 (c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE99/01548

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 1, 9-13, 17, 20, 22-35	YES
	Claims 2-8, 14-16, 18, 19, 21, 36	NO
Inventive step (IS)	Claims 1, 22, 23, 28, 30-32	YES
	Claims 2-21, 24-27, 29, 33-36	NO
Industrial applicability (IA)	Claims 1-36	YES
	Claims	NO

2. Citations and explanations (Rule 70.7)

The claimed invention

The present invention relates to a method, a system and an IP/ATM-network that support multipoint-to-multipoint multicasting that is using only a single spanning delivery tree structure.

Cited document

The examination process has revealed the following documents, which represent the general state of the art:

D1: IEEE: "SPAM: A Data Forwarding Model for Multipoint-to-Multipoint Connection Support in ATM Networks".

D2: MILCOM 96: "A Scaleable Multicast Routing Algorithm for IP-ATM-IP Networks".

D3: EP 0800329 A2

Statement

D1 discloses an ATM network, adapted for Internet protocols, for multipoint-to-multipoint multicasting. Senders and receivers, which all belong to a multicast group, belong to a single tree structure and use only the virtual channel (VC) for transmission of data over the shared tree structure.

D2 describes a method for dynamical multicasting in an IP-over-ATM network. A single multicast routing path can be established. All senders in a multicast group can multicast data to all other group members.

.../...

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Box V. (I)

D3 discloses a system and method for hierarchical multicasting in an IPATM network. By using only one core-based tree structure (CBT) to a multicasting group. The method supports multiple senders and dynamic membership changes to the multicast group. Each multicast group has a core node to which a new node that wants to be a member registers (see column 2 lines 19-33, column 3 lines 5-53, abstract).

What is stated in claims 2, 18, 21, 36 is prior known by each of D1, D2 and D3.

D2 and D3 describe how a CBT algorithm can be used in multicasting. Therefore what is stated in claims 3, 4 lacks novelty.

The system described in D3 permits more than one core node and a dynamic change of a multicasting group. Accordingly what is claimed in claims 5, 6 is not novel.

In D2 and D3 traffic (cells) is routed only in paths in the common tree structure where transmission is necessary for efficiently reaching the destination node(s). The routing of cells depends only on whether the respective node belongs to the respective multicast address, and what has been routed earlier by the node (see page 478, right column, line 33 - page 479, right column, line 34). Accordingly what is stated in claims 7, 8 is not novel.

What is stated in claims 9, 13 concerns accessory technical details that are considered obvious to a person skilled in the art.

In D3 it is described how hierarchical multicasting with more than one core node is supported (see column 9, line 51 - column 10, line 7). Accordingly what is claimed in claims 10-12 is not considered to involve an inventive step.

What is stated in claim 14 is prior known by D3 (see column 5, lines 6-17).

D2 and D3 describe generally how all members in a multicast group are potential senders and receivers of IP multicasting packets, which dynamically can leave and join the group (see D2 page 478, right column, lines 18-23). Therefore the present invention according to claims 15, 16 lacks novelty, and the present invention according to claim 17 is considered not to comprise an inventive step.

.../...

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Box V. (II)

In D1 the ATM switches are functioning as cell switches when sufficient capacity is free between the nodes, while cells are buffered when the load on the respective node is high (see page 386, right column, line 22 - page 387, left column, line 15). The invention as stated in claim 19 is therefore not novel.

In claim 20 it is unclear how interleaving of ATM cells is prevented. Therefore the invention according to claim 20 is not considered to involve an inventive step, since it is only specified in this claim what is performed and not how said implementation is accomplished. For the same reason, the present invention as claimed in claim 24 - 27, 33 is not considered to comprise an inventive step.

In D3 it is described how designated transit lists are updated depending on activities between the nodes in the net. The present invention according to claim 29 is therefore not considered to involve an inventive step.

In D3 it is also described how a non-core node that wishes to leave a multicasting tree is removed at the same time as other nodes between the respective node and core node is removed. Accordingly what is stated in claim 34 is not considered to comprise an inventive step.

Claim 35 describes a method for periodically updating the net to register inactive nodes. This is considered obvious to a person skilled in the art.

What is stated in claims 1, 22, 23, 28, 30-32 has not been found in any of the prior-art-cited documents, and is not considered to be obvious to a person skilled in the art. Therefore what is claimed in claims 1, 22, 23, 28, 30-32 is novel, comprise industrial applicability and is considered to involve an inventive step.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE99/01548

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

In is not stated in claim 25 to which claims it is referring.

There are two claims 15 (the second one should be claim 16).

Claim 29 cannot refer to itself.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 4.3 and 44)

Applicant's or agent's file reference Case 703 PCT	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
International application No. PCT/SE 99/01548	International filing date (day/month/year) 6 Sept 1999	(Earliest) Priority Date (day/month/year) 10 Sept 1998
Applicant Telia AB (publ) et al		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

1. Certain claims were found unsearchable (See Box I).
2. Unity of invention is lacking (See Box II).
3. The international application contains disclosure of a nucleotide and/or amino acid sequence listing and the international search was carried out on the basis of the sequence listing
 - filed with the international application.
 - furnished by the applicant separately from the international application,
 - but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in the international application as filed.
 - transcribed by this Authority.
4. With regard to the title, the text is approved as submitted by the applicant.
 the text has been established by this Authority to read as follows:
**Improvements in, or relating to, multicasting
in ATM-Networks**
5. With regard to the abstract,
 the text is approved as submitted by the applicant.
 the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. The figure of the drawings to be published with the abstract is:
 Figure No. 1 as suggested by the applicant. None of the figures.
 because the applicant failed to suggest a figure.
 because this figure better characterizes the invention.

INTERNATIONAL SEARCH REPORT

1

International application No.

PCT/SE 99/01548

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04Q 11/04

According to International Patent Classification (IPC) or to both national classification and IPC:

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Computer Communication and Networks. Proceedings, 6th Int. Conf., Volume, 1997, Sridhar Komandur et al, "SPAM: A Data Forwarding Model for Multipoint-to-Multipoint Connection Support in ATM Networks", p.386 right col. line 22-p.387 left col. line 15 --	1-2,19-28,37
X	IEEE, Milcom 96 Conference Proceedings, Volume 2, October 1996, Mohammed Arozullah et al, "A Scalable Multicast Routing Algorithm for IP-ATM-IP Networks", p.478 right col. line 33-p.479 right col. line 34 --	1-4,7-9, 16-19,21-28, 30,34-37

 Further documents are listed in the continuation of Box C. See patent family annex.

- * Special categories of cited documents
- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed
- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

10 February 2000

Date of mailing of the international search report

2000-02-16

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Authorized officer

Måns Marklund/CL
Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 99/01548

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>EP 0800329 A2 (LUCENT TECHNOLOGIES INC.), 8 October 1997 (08.10.97), column 2, line 19 - line 33; column 3, line 5 - line 53; column 5, line 6 - line 17, abstract, col. 9, line 51 - col. 10, line 7; col 10, line 17 - 40; col. 11, line 44 - col. 12, line 29</p> <p>--</p> <p>-----</p>	1-12, 14-18, 21-28, 30, 34-37

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

02/12/99

PCT/SE 99/01548

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0800329 A2	08/10/97	CA 2198308 A JP 10032594 A US 5831975 A	05/10/97 03/02/98 03/11/98

PATENT COOPERATION TREATY
PCT
INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference Case 703 PCT	FOR FURTHER ACTION		See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/SE99/01548	International filing date (<i>day month year</i>) 06.09.1999	Priority date (<i>day month year</i>) 10.09.1998	
International Patent Classification (IPC) or national classification and IPC ₇ H04Q 11/04			
Applicant Telia AB (publ) et al.			

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 7 sheets.

3. This report contains indications relating to the following items:

- I Basis of the report
- II Priority
- III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV Lack of unity of invention
- V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability, citations and explanations supporting such statement
- VI Certain documents cited
- VII Certain defects in the international application
- VIII Certain observations on the international application

Date of submission of the demand 07.04.2000	Date of completion of this report 12.12.2000
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88	Authorized officer Oskar Pihlgren /OGU Telephone No. 08-782 25 00

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE99/01548

I. Basis of the report

1. With regard to the elements of the international application:^{*} the international application as originally filed the description:pages 1 - 20, as originally filed

pages _____, filed with the demand

 the claims:

pages _____, as originally filed

pages _____, as amended (together with any statement) under article 19

pages _____, filed with the demand

 the drawings:pages 1 - 9, as originally filed

pages _____, filed with the demand

 the sequence listing part of the description:

pages _____, as originally filed

pages _____, filed with the demand

pages _____, filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item. These elements were available or furnished to this Authority in the following language _____ which is:

 the language of a translation furnished for the purposes of international search (under Rule 23.1(b)). the language of publication of the international application (under Rule 48.3(b)). the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

 contained in the international application in written form. filed together with the international application in computer readable form. furnished subsequently to this Authority in written form. furnished subsequently to this Authority in computer readable form. The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished. The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.4. The amendments have resulted in the cancellation of: the description, pages _____ the claims, Nos. _____ the drawings, sheet/fig. _____5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2 (c)):**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE99/01548

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Claims Claims	<u>1, 9-13, 17, 20, 22-35</u> <u>2-8, 14-16, 18, 19, 21, 36</u>	YES NO
Inventive step (IS)	Claims Claims	<u>1, 22, 23, 28, 30-32</u> <u>2-21, 24-27, 29, 33-36</u>	YES NO
Industrial applicability (IA)	Claims Claims	<u>1-36</u>	YES NO

2. Citations and explanations (Rule 70.7)The claimed invention

The present invention relates to a method, a system and an IP/ATM-network that support multipoint-to-multipoint multicasting that is using only a single spanning delivery tree structure.

Cited document

The examination process has revealed the following documents, which represent the general state of the art:

D1: IEEE: "SPAM: A Data Forwarding Model for Multipoint-to-Multipoint Connection Support in ATM Networks".

D2: MILCOM 96: "A Scalable Multicast Routing Algorithm for IP-ATM-IP Networks".

D3: EP 0800329 A2

Statement

D1 discloses an ATM network, adapted for Internet protocols, for multipoint-to-multipoint multicasting. Senders and receivers, which all belong to a multicast group, belong to a single tree structure and use only the virtual channel (VC) for transmission of data over the shared tree structure.

D2 describes a method for dynamical multicasting in an IP-over-ATM network. A single multicast routing path can be established. All senders in a multicast group can multicast data to all other group members.

.../...

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Box V. (I)

D3 discloses a system and method for hierarchical multicasting in an IPATM network. By using only one core-based tree structure (CBT) to a multicasting group. The method supports multiple senders and dynamic membership changes to the multicast group. Each multicast group has a core node to which a new node that wants to be a member registers (see column 2 lines 19-33, column 3 lines 5-53, abstract).

What is stated in claims 2, 18, 21, 36 is prior known by each of D1, D2 and D3.

D2 and D3 describe how a CBT algorithm can be used in multicasting. Therefore what is stated in claims 3, 4 lacks novelty.

The system described in D3 permits more than one core node and a dynamic change of a multicasting group. Accordingly what is claimed in claims 5, 6 is not novel.

In D2 and D3 traffic (cells) is routed only in paths in the common tree structure where transmission is necessary for efficiently reaching the destination node(s). The routing of cells depends only on whether the respective node belongs to the respective multicast address, and what has been routed earlier by the node (see page 478, right column, line 33 - page 479, right column, line 34). Accordingly what is stated in claims 7, 8 is not novel.

What is stated in claims 9, 13 concerns accessory technical details that are considered obvious to a person skilled in the art.

In D3 it is described how hierarchical multicasting with more than one core node is supported (see column 9, line 51 - column 10, line 7). Accordingly what is claimed in claims 10-12 is not considered to involve an inventive step.

What is stated in claim 14 is prior known by D3 (see column 5, lines 6-17).

D2 and D3 describe generally how all members in a multicast group are potential senders and receivers of IP multicasting packets, which dynamically can leave and join the group (see D2 page 478, right column, lines 18-23). Therefore the present invention according to claims 15, 16 lacks novelty, and the present invention according to claim 17 is considered not to comprise an inventive step.

.../...

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE99/01548

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Box V. (II)

In D1 the ATM switches are functioning as cell switches when sufficient capacity is free between the nodes, while cells are buffered when the load on the respective node is high (see page 386, right column, line 22 - page 387, left column, line 15). The invention as stated in claim 19 is therefore not novel.

In claim 20 it is unclear how interleaving of ATM cells is prevented. Therefore the invention according to claim 20 is not considered to involve an inventive step, since it is only specified in this claim what is performed and not how said implementation is accomplished. For the same reason, the present invention as claimed in claim 24 - 27, 33 is not considered to comprise an inventive step.

In D3 it is described how designated transit lists are updated depending on activities between the nodes in the net. The present invention according to claim 29 is therefore not considered to involve an inventive step.

In D3 it is also described how a non-core node that wishes to leave a multicasting tree is removed at the same time as other nodes between the respective node and core node is removed. Accordingly what is stated in claim 34 is not considered to comprise an inventive step.

Claim 35 describes a method for periodically updating the net to register inactive nodes. This is considered obvious to a person skilled in the art.

What is stated in claims 1, 22, 23, 28, 30-32 has not been found in any of the prior-art-cited documents, and is not considered to be obvious to a person skilled in the art. Therefore what is claimed in claims 1, 22, 23, 28, 30-32 is novel, comprise industrial applicability and is considered to involve an inventive step.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE99/01548

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

In is not stated in claim 25 to which claims it is referring.

There are two claims 15 (the second one should be claim 16).

Claim 29 cannot refer to itself.